

TO PTO MARCH 31, 2004

U 015127-5

351/NF/03

**PROCESS FOR PREPARING DIOXY-FUNCTIONALIZED PROPANE COMPOUNDS****Field of the invention**

The present invention relates to a process for preparing dioxy functionalised propane compounds using cobalt and/or rhodium catalysts. More particularly, the present invention relates to a process for the preparation of the dioxy functionalised propane compounds of the formula  $X-CH_2-CH(Y)-CH_2-Z$ , wherein  $X = R-C(=O)-O-$  or  $H$  or  $-OH$ ,  $Y$  and  $Z = -H$  or  $-OH$  or  $-C(=O)H$ , and wherein at a time, only one of  $X$ ,  $Y$  and  $Z$  is  $-H$ , in high yields from vinyl carboxylates of formula  $R-C(=O)-O-CH=CH_2$  wherein,  $R =$  substituted or unsubstituted alkyl or aryl group.

**Background of the invention**

Dioxy-functionalized compounds such as propanediols are useful products having a variety of applications. 1,2-propanediol (1,2-PDO) is used as a coolant and antifreeze agent, and also to prepare polypropylene glycol. 1,3-propanediol (1,3-PDO) is a useful intermediate in production of polyesters for fibers and films as well as starting material for synthesis of cyclic compounds. 1,3-PDO is also a useful intermediate in the production of polyurethanes.

Several methods have already been suggested for the preparation of 1,2-PDO, as well as 1,3-PDO. 1,2-PDO is obtained for example by hydrolysis of propylene oxide. 1,3-PDO is obtained either by acrolein hydration route or by ethylene oxide hydroformylation route or by biotransformation of a carbohydrate source. In U.S. Patent 2,434,110 acrolein is hydrated in the presence of an acidic catalyst to form 3-hydroxypropanal. The reaction takes place preferably at an elevated temperature using a 5 to 30 % by weight solution of acrolein in water and an acid such as sulphuric acid, phosphoric acid or acidic salts of these acids, acidic resins as the catalyst. The reaction mixture obtained during the hydration is hydrogenated, preferably after removal of non-reacted acrolein, in the presence of customary hydrogenation catalysts. DE-A3926136, DE-A 4038192, US-2638479, US-3536763, US- 5015789, US-5093537, US-5171898, US-5276201, and US-5364987 also describe processes for production of 1,3-propanediol from acrolein. The drawbacks of the above referred documents are use of acrolein, which is corrosive and highly toxic material, relatively low reaction rates, lesser product yields and unwanted side reactions at higher acrolein conversion. Therefore, this approach has not particularly been attractive for making 1,3-propanediol in large quantities.

The preparation of 1,3-PDO by hydroformylation of epoxides utilizing cobalt carbonyl or rhodium carbonyl complexes as catalysts is disclosed in many documents. References is made to U.S. Patents 3463819, 5304691, 5344993, 5304686, 5545766,